FIGHT'S ON!

Quarterly Publication from the Warfighter Readiness Research Division (AFRL/HEA)
of the Air Force Research Laboratory Human Effectiveness Directorate

Volume 5, Issue 1
Spring 2005

Warfighter Training Research on World Stage

Two weeks prior to Joint Red Flag (JRF) 05-3.2, a Coalition Mission Training Research (CMTR) trial called "Red Skies" enabled teams of warfighters to plan, brief, execute, and debrief similar missions in a Distributed Mission Operations (DMO) environment. During Red Skies, another milestone in the ongoing CMTR program, US F-16 "Viper" pilots and Royal Air Force (RAF) GR4 "Tornado" aircrews flew missions over the Nevada Test and Training Range (NTTR) synthetic battlespace over the same Nellis Range Complex targets they would engage during the live, virtual, and constructive JRF 05-3.2 exercise.

Maj "Beech" Snider, 113th FS, conducts the interactive Mission Commander briefing with RAF crews linked from Bedford England. Viper pilots, GR4 crews, and RAF AWACS warfighters conducted Red Skies missions under Red Flag rules

Terre Haute IN Air National Guard (ANG), flew the four-ship of high-fidelity Viper Multi-Task Trainers (MTT) in the DMO Testbed. Joining the 113th FS pilots in the DMO Testbed were three E-3D Airborne Warning and Control System (AWACS) Senior Directors from RAF Waddington, who provided Command and Control (C2) from the Weapons Control Station. Although there were RAF warfighters at MRS, the primary purpose of Red Skies was to conduct long-haul DMO scenarios between the US and UK...across the

Lt Col "Buzz" Doyle, 113th FS, notes the value of DMO training research to Maj Gen Mike DeCuir, ACC/DO, during Red Skies scenarios flown with RAF warfighters over the NTTR database

The Air Force Research Laboratory (AFRL), the UK's Defence Science and Technology Laboratory (DSTL), Defence Research and Development Canada (DRDC), and Australia's Defence Science and Technology Organisation cooperate under the CMTR program. During Red Skies, scientists from all four laboratories scrutinized technology's ability to support mission readiness while warfighters operated weapons systems at simulation sites in the UK and AFRL's Mesa Research Site (MRS).

At MRS, F-16 pilots of the 113th Fighter Squadron (FS), "Indiana Racers,"

Maj Gen DeCuir discusses JRF 05-3.2 live, virtual, and constructive operations with Gen John Jumper, CSAF, following a Joint Red Flag orientation at Nellis AFB

Squadron Leader "Dizzy" Disdel, RAF Waddington, provides AWACS support to Red Skies warfighters at MRS and Bedford

Atlantic Ocean, wherein an RAF Forward Air Controller vectored the Viper pilots to common targets while GR4 Tornado aircrews from 13th Squadron, RAF Marham, operated over the NTTR from simulators at the DSTL facilities in Bedford England!

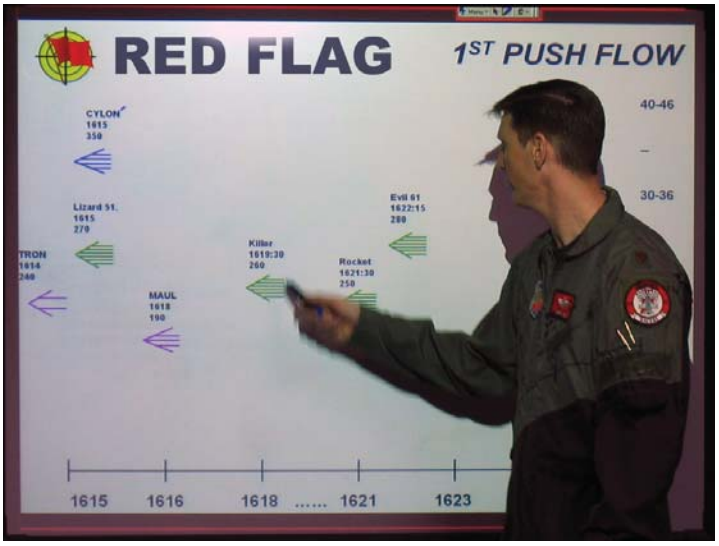
Separated by more than 5,000 miles but linked by video-teleconferencing (VTC) and simulation equipment, the RAF and ANG warfighters conducted full-scale digital mission planning, briefing, and debriefing for Red Skies missions flown over NTTR. During Red Skies, they interacted "face-to-face" through the "magic" of innovative technologies while CMTR experts gained subjective and objective research data.

Using a carefully researched suite of commercial and government off-the-shelf (COTS and GOTS) products, Team Mesa integrated a system that enabled warfighters to communicate in real-time with encrypted voice, video, and data. A COTS VTC system allowed Red (threat), White (exercise staff), and Blue (friendly) forces to see and hear each other clearly throughout the CMTR trial. Operators shared GOTS FalconView™ maps and mission rehearsal files via a COTS interactive collaboration tool, planning and briefing within a geographically separated "shared workspace" as though they were physically face-to-face. With these tools, operators in the UK and the US were able to simultaneously annotate and draw on maps and slides – capabilities that greatly enhanced planning, briefing, and debriefing activities. Remote debriefs involving Red, White, and Blue forces were facilitated by AFRL's DMO Control Station software and COTS/GOTS tools, and allowed all personnel to apply each day's lessons learned to the next day's operations.

Developed in less than six months to secure DMO events, Team Mesa also configured the Simulator Perimeter Network Security System (SPNSS) as a proof-of-concept to seamlessly protect all real-time simulation and VTC traffic during Red Skies. Its design guaranteed that only authorized traffic was routed through the network, and its intrusion detection alarm guarded against malicious (unauthorized) attacks. Unlike typical firewall setups, SPNSS allows broadcast Distributed Interactive Simulation traffic to pass securely through the system. The $20K SPNSS firewall and intrusion detection configuration will be fielded to multiple DMO nodes as a "cheaper, better, faster" secure network solution.

The 113th FS and 13th Squadron warfighters alternated Mission Commander duty each day. Blue Force packages were planned and tasked using electronic tools similar to those used for Red Flags. The Air Tasking Order (ATO) was delivered in time to allow the Mission Commander to delegate planning and coordination tasks among the warfighters at least one day prior to the "fragged" mission. As in the real world, the Combined Air and Space Operations Center (CAOC) produced the ATO, or "frag order," delineating which targets were to be struck and which units and weapons would execute the mission. These missions were made all the more complicated by a sophisticated Integrated Air Defense System (IADS) of computer-generated forces (CGF) designed to realistically mimic surface-to-air and air-to-air threats.

Each Mission Commander had to contemplate ingress and egress routes to best avoid the IADS, a major consideration influencing decisions on how to integrate multiple friendly assets, such as constructive F-15Es (4), F-18Cs (4), AV-8s (4), F-15Cs, EA-6s (2), and F-16CJs (4), to execute the overall gameplan. To supplement the Red Skies warfighters, friendly CGFs were fragged by the ATO to accomplish a variety of support missions, such as Suppression of Enemy Air Defenses and Offensive Counter Air. By rounding out the Large Force Exercise with CGFs replicating capabilities needed to penetrate the IADS, Red Skies warfighters noted that the realism of the "gorilla package" scenarios raised the bar on their need for exceptional mission coordination and execution.



As Mission Commander for the day, Maj "Beech" Snider emphasizes flow times for the virtual and CGF packages "pushing" into defended target areas on the Nellis Range Complex

Red Skies provided unique opportunities for participating warfighters to brainstorm tactical employment ideas, execute those concepts in the synthetic NTTR battlespace, and thoroughly review digital data captured during missions to ingrain lessons learned prior to JRF 05-3.2. For JRF 05-3.2 missions at Nellis AFB, Red Skies participants imparted unique tactical perspectives gained from their DMO experience to USAF, sister-Service, and coalition warfighters while operating out of the 414th Combat Training Squadron's Red Flag building.

Via the video, "DMO: The Warfighter's New Edge," the Air Force Chief of Staff (CSAF) introduced warfighters to the vision of seamless readiness training with live, virtual, and constructive operations during JRF 05-3.2. More than 10,000 participants in 44 different sites generated 24,000 sorties during JRF 05-3.2; approximately 4,000 were live-fly, 7,000 were virtual, and 18,000 were constructive. CSAF emphasized training transformation with "DMO is crucial to giving us the 21st Century edge required to defend freedom...our plan is to stage many of these large scale virtual exercises" so DMO becomes the training norm. Team Mesa is collaborating with US and international partners to develop training technologies and methods, as showcased in Red Skies, Virtual Flag, and CMTR data collection at Nellis, to help hone this new edge.

Red Skies warfighters from the US and UK met face-to-face during JRF 05-3.2. The 113th FS and 13th Squadron warfighters had already operated together in the DMO battlespace over the Red Flag operating area before arriving at Nellis AFB NV

In concert with live-fly JRF 05-3.2 events, Virtual Flag 05-3 connected numerous nodes where warfighters executed simulated missions. CSAF underscored the need to fuse C2, Intelligence, Surveillance, and Reconnaissance (ISR) assets with DMO, to "link up in a virtual battlespace wherever you are and train with all the same people and systems you will fight with." To that end, Virtual Flag and JRF participants were supported by CAOC-Nellis and a fusion of C2ISR assets "where DMO comes into play."

The Intelligence Officer of the 188th FS helps Taco pilots "break out the frag" before each day's Virtual Flag missions. CAOC-Nellis put out the ATO for JRF 05-3.2 and Virtual Flag during what is considered the largest distributed exercise in the history of the US military

Orchestrating live, virtual, and constructive coalition day/night interdiction and Joint Close Air Support (JCAS) missions for multiple overlapping large force exercises, CAOC-Nellis allowed JRF and Virtual Flag warfighters "to practice complex missions rather than independent elements and...to incorporate our allies and coalition partners as well." While Team Mesa members were collecting CMTR data from the Red Skies participants during JRF 05-3.2 at Nellis, MRS hosted the 188th FS "Tacos" who executed Virtual Flag missions in DMO Testbed systems over the NTTR database.

The 188th FS intelligence officer helped the pilots break out the ATO issued by CAOC-Nellis, and together the Tacos applied force employment concepts outlined in Air Force Tactics, Techniques, and Procedures 3-1 to plan missions against fixed and mobile IADS threats. During this Virtual Flag, the Tacos operated from a geographically separated site (MRS) as part of the largest live, virtual, and constructive integrated exercise designed to address individual, team, and teams-of-teams warfighter training.

To further quote CSAF, "Airmen who have been through the DMO training experience want more because they know DMO works for them. That's just the beginning. DMO is still evolving throughout the Air Force and DoD." Witnessed on the world stage, Team Mesa's R&D programs continue to transition DMO technologies and methods to transform readiness training for the warfighter.

During Red Skies, RAF Waddington AWACS directors participate in DMO training research using the Pathfinder interactive software tool designed to explore perceptions of C2 operators

TARGETS OF OPPORTUNITY

Through an **Air and Space Operations Center (AOC) training research** workshop, Team Mesa facilitated objective measures of C2 performance using the Mission Essential Competency (MEC) process pioneered in the air-to-air domain. C2ISR subject-matter experts from the 505th Command and Control Wing and CAOC-Nellis applied performance criteria to specific MECs spanning Time Sensitive Targeting (TST) operations. These criteria will be evaluated during AOC training research activities at MRS and operations in AOC facilities.

RAF Strike Command leadership, Air Commodore Harwood, Group Captain Fynes, and Wing Commander Dobson, discuss plans for JCAS simulation development for the RAF by leveraging AFRL's DMO R&D programs

Team Mesa hosted a visit by Mr. Russell Lenz, Director of the US Army's SFC Paul Ray Smith (posthumous Medal of Honor) **Simulation and Training Technology Center**. Mr. Lenz advocated increased Army and AF collaboration to develop, improve, and integrate technologies aimed at shaping the future Joint Fighting Force, particularly in the areas of JCAS, DMO, cognitive modeling, and C2ISR training research.

BRIEFS AND DEBRIEFS

The JCAS training research program at MRS will get a huge boost when this structure stands up as a Joint Terminal Attack Control virtual trainer, complete with immersive visuals and interactive systems

Two squadrons of the **USAF Weapons School**, Nellis AFB, incorporated DMO training research in the Weapons Instructor Course (WIC) for students in WIC Class 05A. In conjunction with the Air Combat Tactics/Tactical Intercept live-fly phase of the WIC syllabus, students and instructors from the 8th Weapons Squadron (WPS) and 16th WPS executed the 5-ride WIC syllabus in the DMO Testbed. Further advancing the Division's efforts, 8 WPS Air Battle Manager experts helped optimize the interactive Pathfinder software tool for C2 training research.

Symposium on Methods and Tools for Analyzing Work in the 21st Century was held in conjunction with the International Occupational Analysis Workshop (IOAW) in San Antonio. The event was organized by Capt Michelle Nash and Dr. Wink Bennett, AFRL/HEA, and supported by L-3 Communications and the IOAW team from the USAF Occupational Measurement Squadron, Randolph AFB TX. The keynote speaker was Dr. Henk Ruck, Director, AFRL Human Effectiveness Directorate. The symposium is the precursor to a new textbook on job, work and organizational analysis due out next year.

Fight's On! is published quarterly by the Warfighter Readiness Research Division of the Air Force Research Laboratory's Human Effectiveness Directorate, 6030 S. Kent Street, Mesa, AZ 85212-6061.
Visit the Division's website at www.mesa.afmc.af.mil
Fight's On! Government Point of Contact: Mr. Jeff Carr, 480-988-6561 x 201, DSN 474-6201, and e-mail jeff.carr@mesa.afmc.af.mil

AFRL/HEA UPAR Case File No. HEA-05-075